

Chapter 1

MEASUREMENT

Chapter 1 Assessment

Vocabulary

Select the correct term to complete the sentences.

accuracy	graph	parsec
conversion factor	independent variable	precision
dependent variable	inverse relationship	resolution
dimensional analysis	length	scatterplot
direct relationship	light year	SI
distance	measurement	significant digits
English System	meter	unit

Section 1.1

1. A(n) ____ is a standard amount, like a kilometer or a gallon, which is used to communicate various quantities.
2. The ____ is a measurement system used for everyday measurements in the United States.
3. ____ is the international system of units used by scientists.
4. When someone determines the amount of something using a value and a unit, they are making a(n) ____.
5. When you describe how close a measured quantity is to a true or accepted value, you are describing its ____.
6. ____ describes how close together repeated measurements are.
7. ____ refers to the smallest interval that can be measured.

Section 1.2

8. ____ describes how far it is from one place to any other place.
9. The amount of space between two points is measured in units of ____.
10. A(n) ____ is the distance light can travel in one year.

11. A(n) ____ is a unit of length in SI that equals 100 cm.
12. A(n) ____ is equal to about 3.26 light years.

Section 1.3

13. ____ are meaningful digits in a measured quantity.
14. A ratio that has a value of one and is used when setting up unit conversion problems is called a(n) ____.
15. A method of using conversion factors and unit canceling to solve a unit conversion problem is called ____.

Section 1.4

16. A(n) ____ is shown by a continuous smooth curve rising from left to right on a scatterplot.
17. The ____ can also be called the manipulated variable.
18. A(n) ____ is also called an XY graph, and it is often used to determine if one variable causes an effect in another variable.
19. The ____ is always plotted on the y -axis of a scatterplot.
20. A(n) ____ is a visual representation of data; there are four major types.
21. When one variable decreases as another increases, you have a(n) ____.

Concepts

Section 1.1

1. Explain, using examples, how SI and English systems of measurement are both used in daily life in the United States.
2. Define the terms *accuracy*, *precision*, and *resolution*. Give an example of each.

Section 1.2

- What are the two different ways to understand time? Give examples to support your explanation.
- In the following list of units, which are SI units of length? mm, yd, cm, mi, m, g, mg, lb, oz, km, ml
- Why are light years used to measure distances to stars instead of kilometers?
- Which is a larger unit of distance: a light year or a parsec? Justify your answer.

Section 1.3

- How do you use the SI conversion tool to perform unit conversions? Explain the process step by step.
- Why can't you use the SI conversion tool to convert from SI to English units?
- The dimensional analysis method of unit conversion is sometimes called "unit canceling." Explain why this is a good name for the method.
- Why do you often have to round off answers to math problems that involve measured quantities?

Section 1.4

- A blank graph grid is 20 boxes by 20 boxes. You want to plot a data set on this graph. The range of x -axis values is 0–60. The range of y -axis values is 0–15. Sketch the best scale to use that would maximize the graph size.
- You wish to make a graph of the height of the Moon above the horizon every 15 minutes between 9:00 p.m. and 3:00 a.m. during one night.
 - What is the independent variable?
 - What is the dependent variable?
 - On which axis should you graph each variable?

Problems**Section 1.1**

- Which of the following is closest to 2 cm?
 - the width of your pinky finger
 - the length of a dollar bill
 - the length of a small paperclip
- Rank these units from smallest to largest: micrometer, nanometer, kilometer, centimeter, meter.

Section 1.2

- Arrange the following intervals of time from shortest to longest: 160 seconds, 2 minutes, 2 minutes 50 seconds.
- Write 3,800 seconds in hours, minutes, and seconds.
- What is the length of the object shown below?

**Section 1.3**

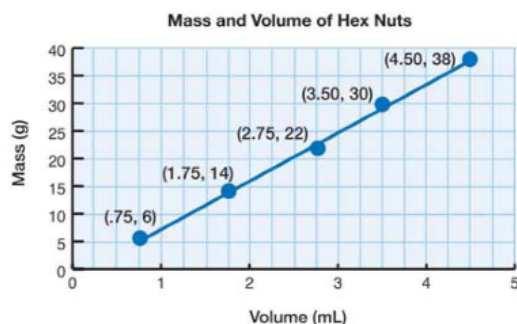
- Convert 54 grams to kilograms.
- Convert 26 decimeters to meters.
- Convert 1,200 meters to millimeters.
- Convert 525 pounds to kilograms. Show your dimensional analysis setup. 1 kilogram = 2.2 pounds.
- A runner completes a 4,000.-meter race. How many yards did she run? Show your dimensional analysis setup.
- A star is 15 parsecs from Earth. How far is this distance in light years? How far in kilometers?

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Section 1.4

Use the graph of mass versus volume to answer the questions in this section of problems. The graph was created by a student who measured the mass and volume of a collection of hex nuts from a hardware package. Each hex nut was made of the same material, and each was the same size and shape.



12. Each data point in the mass versus volume graph represents adding another hex nut to the group. The first data point shows the mass and volume of one hex nut, and the second data point shows the mass and volume of two hex nuts together, and so on up to five hex nuts.
 - a. What is the mass and volume of one hex nut?
 - b. What is the mass and volume of five hex nuts together?
 - c. What do you predict the mass and volume of six hex nuts would be?
13. What type of relationship exists between mass and volume on the mass versus volume graph?

14. Make a quick sketch of what you think the scatterplot would look like if you used random hex nuts of different materials and sizes, rather than a collection that is all the same.

Applying Your Knowledge**Section 1.1**

1. Do some research to find out what influenced the development of the International System of Units. Where did the system originate? When did other countries decide to adopt the system? Did the United States adopt the system? (You might be surprised at what your research will reveal!)
2. Do you think the U.S. will ever switch completely to SI? Why or why not?

Section 1.2

3. What is the distance from Earth to the Moon? Is that distance changing? Do some research to find out.

Section 1.3

4. Why do you think it is necessary to know how to convert from English to SI units and vice versa? Give your own example.

Section 1.4

5. Look through recent newspapers and/or magazines to find at least one example of a scatterplot, bar graph, pie graph, and line graph. Photocopy or cut out the graph examples and create a small poster that illustrates the differences between these types of graphs.